Rapid Terrain Visualization

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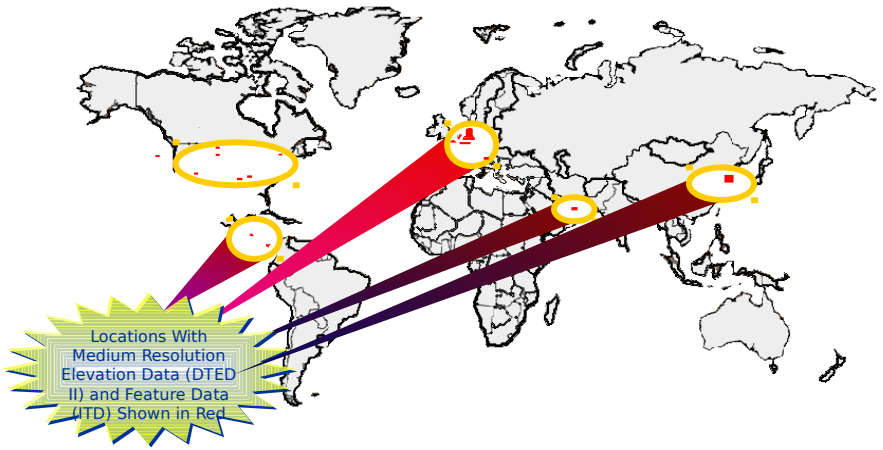
Rapid Terrain Visualization Improvements

Problem

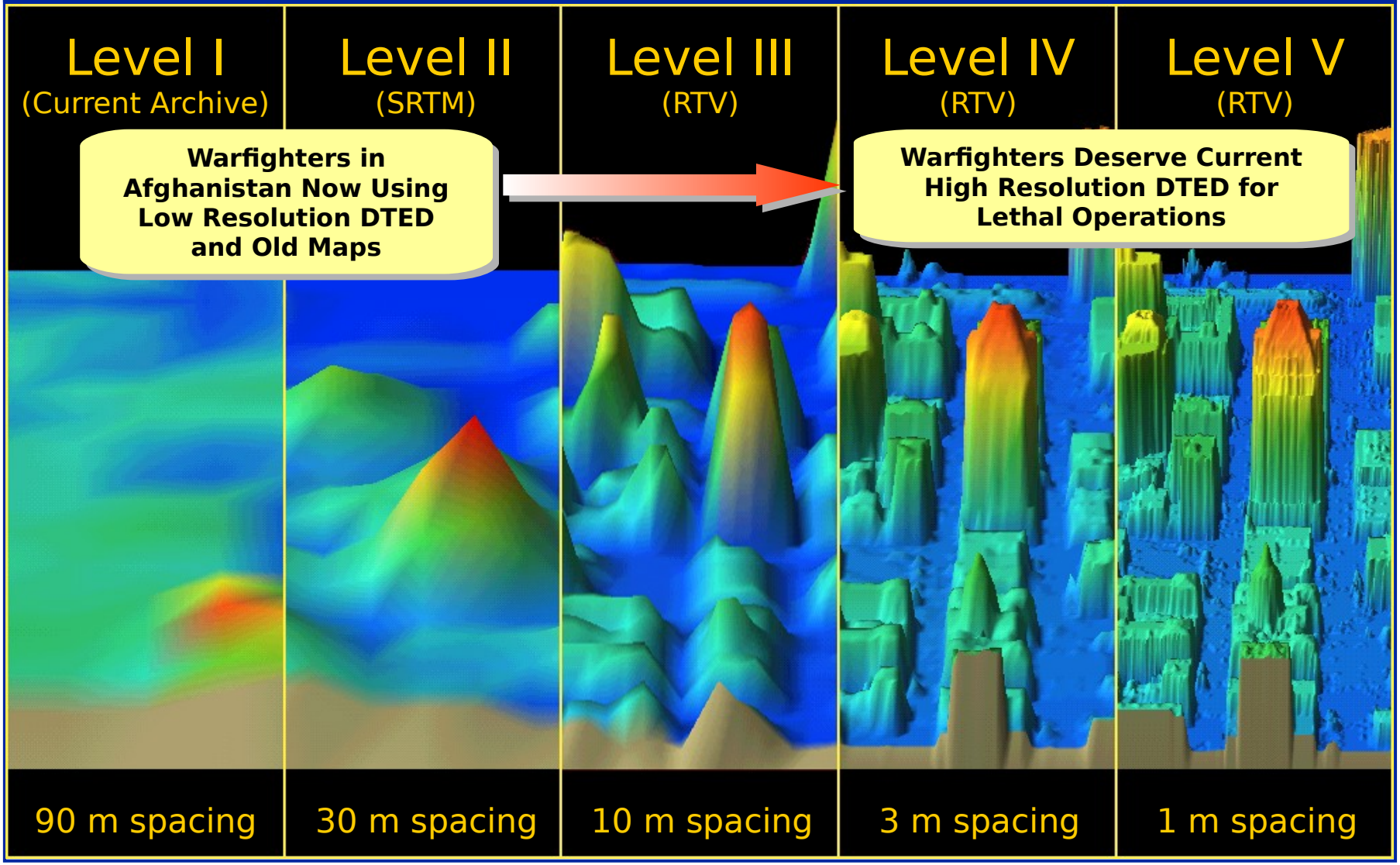


• High Resolution Terrain Elevation and Feature Data are not Available From Other Sources
• DoD Does not have the Capability to Rapidly Produce Them

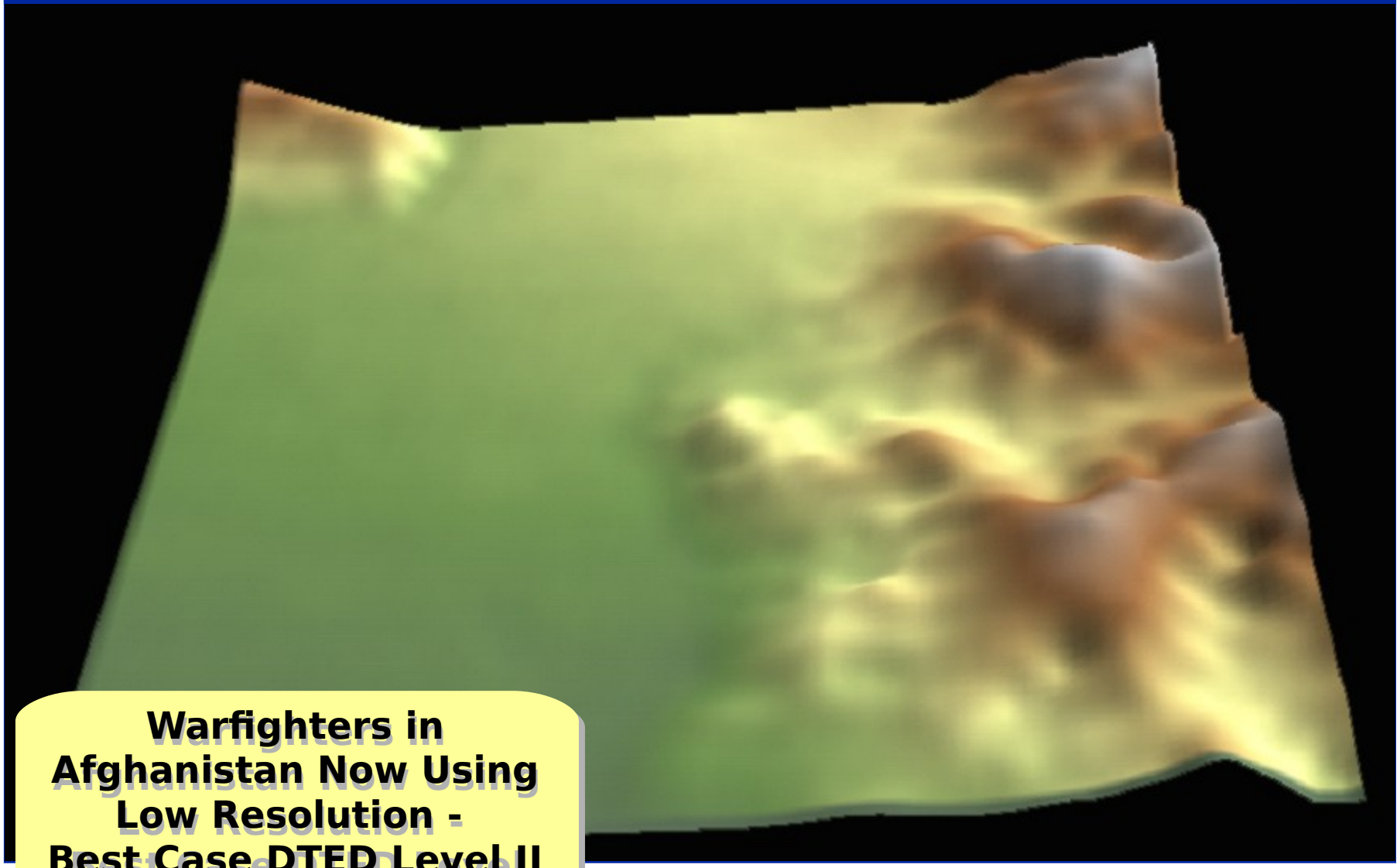
Improvements

1. Reduced Timelines for Delivery of Digital Terrain Maps to Soldiers From **YEARS** to **DAYS** (Kosovo in ~ 2 Weeks)
2. Increased Resolution and Accuracy of Digital Terrain by Over **100%**
3. Provides **All Weather & Day/Night** Capability (Critical for Cloud Covered Regions)
4. Processes 4 Meter Resolution **Multi-Spectral Imagery (MSI)** for Image Maps and Extraction of Urban and Terrain Features
5. Provides Sub-foot Resolution **Synthetic Aperture Radar (SAR)** Imagery for Reconnaissance and Target Identification
6. Providing a Revolutionary Capability for **Urban Warfare, Disaster Relief** (Hurricanes, Floods, etc.) and **Drug Interdiction**
7. Delivering Digital Maps for Contingency

DTED Resolution Comparison

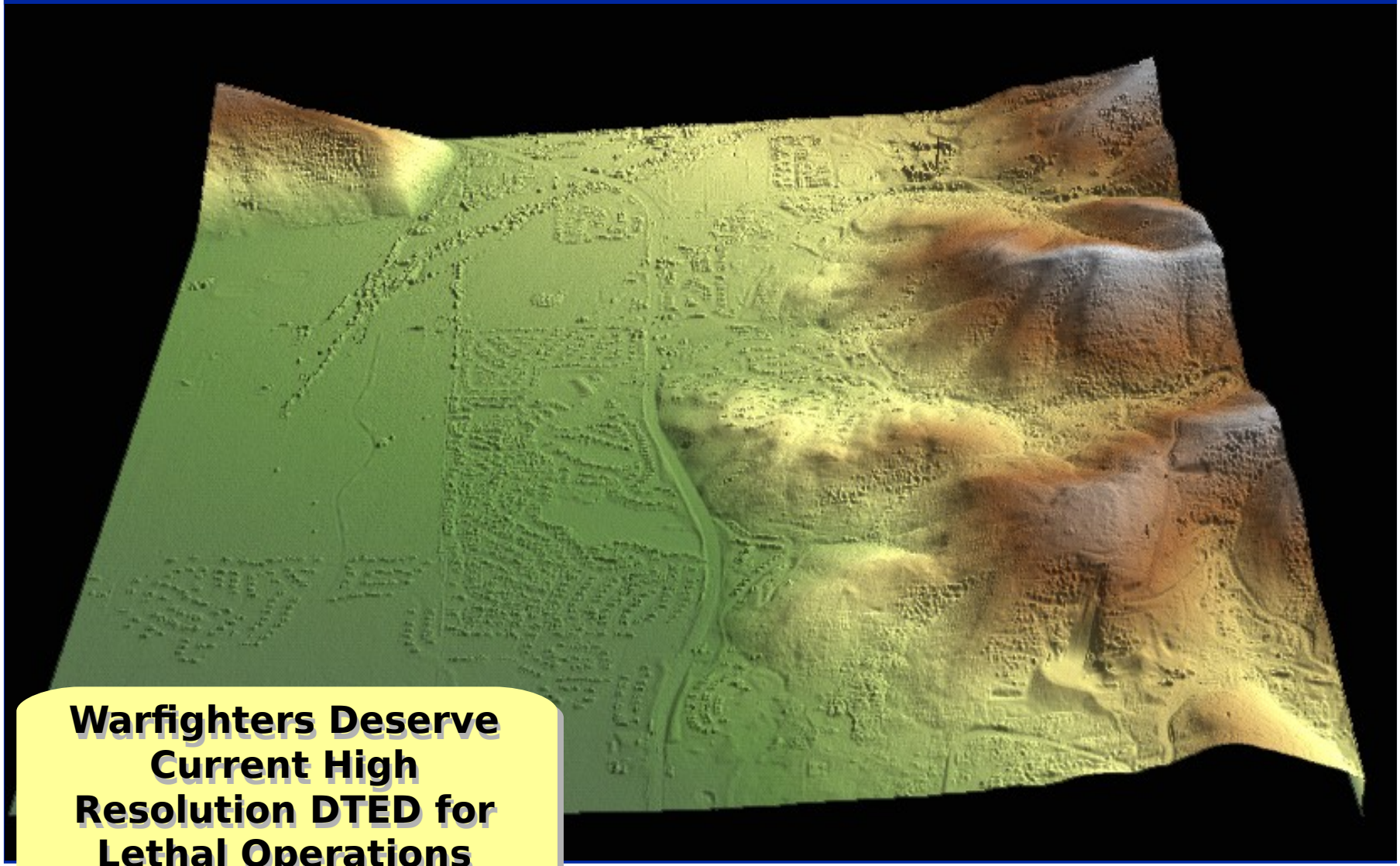


Best Available
DTED Level II



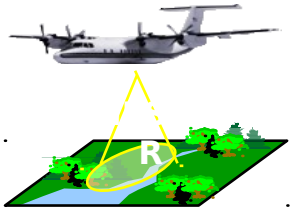
Warfighters in Afghanistan Now Using Low Resolution - Best Case DTED Level II

Tactical IFSAR
DTED Level IV



Warfighters Deserve Current High Resolution DTED for Lethal Operations

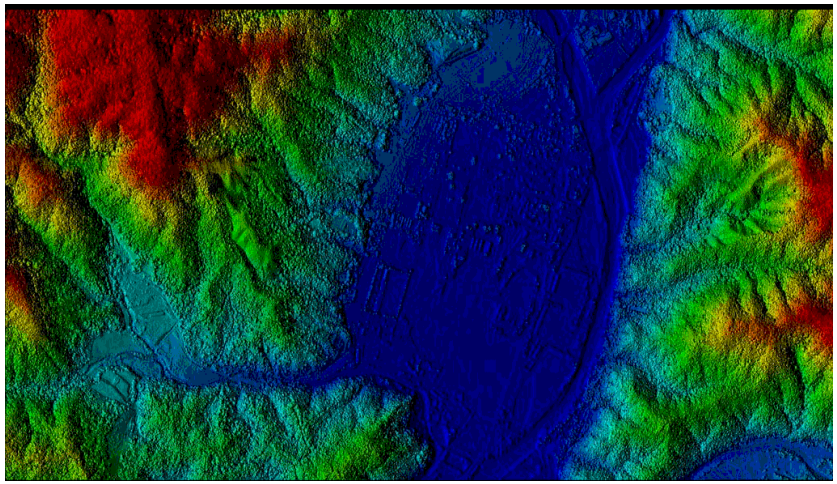
Rapid Terrain Visualization Program

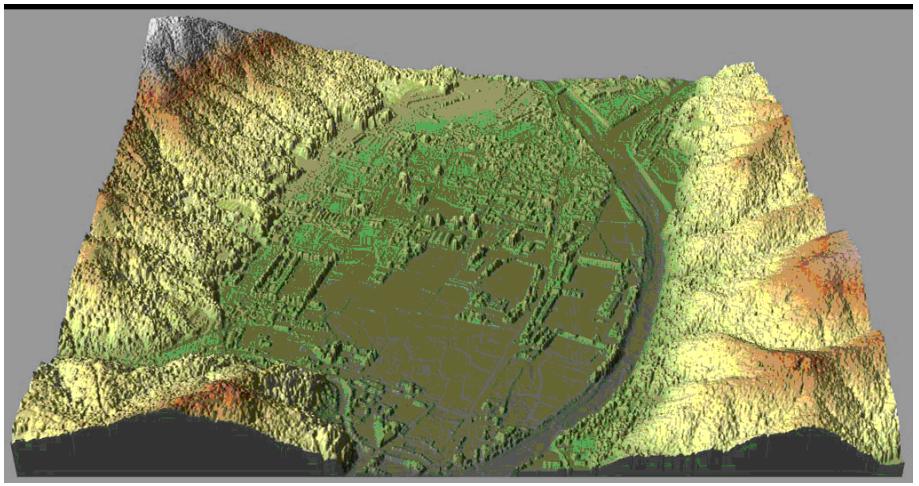


Mission: Utilize ACTD Proven Technologies and Infrastructure to Meet the Army Requirement for Rapid Generation of Digital Terrain Data to Support Emerging Crisis or Contingency Operations World Wide

Sample

Top Yong, ROK



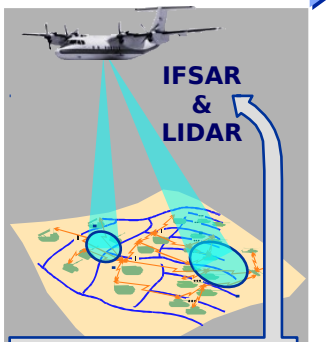


Rapid Terrain Visualization Operations

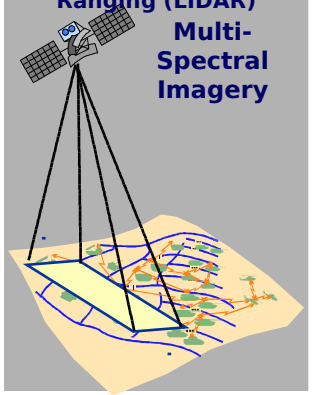
RTV Program Focus

Leverage Others

Source Data Collection



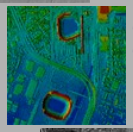
InterFerometric Synthetic Aperture Radar (IFSAR) & Light Detection and Ranging (LIDAR)



Data Generation

Terrain Generation

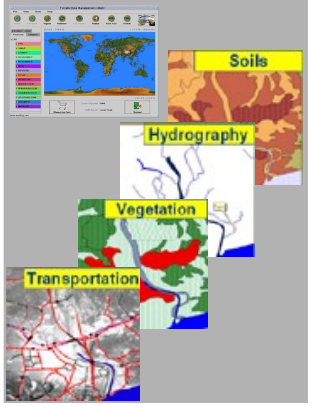
Digital Elevation Models (DEM)



Color Coded DEM Images

Ortho-SAR & Intensity Images

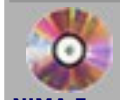
Feature Generation



Transformation

Standardized Products
- GeoTIFF (DEM/Images)
- Binary

Modeling and Simulation Products
- Synthetic Environment Data Requirement Interchange Specification (SEDRIS)



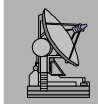
NIMA Format Products
- Vector Interim Terrain Data (VITD)
- Digital Topographic Data (DTOP)
- Foundation Feature Data(FFD)
- Urban Mission Specific Data Set

Modeling and Simulation Product

Dissemination

Global Broadcast System

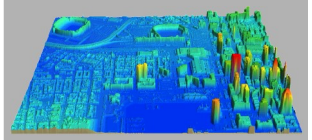
SATCOM



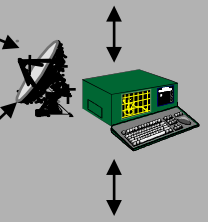
Defense Information System Network/ Warfighter Information Network-Terrestrial

Applications

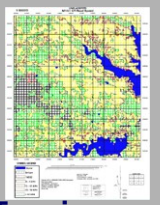
Battlefield



Battlefield Planning and Visualization, TerraBase II, Erdas, TopScene, PowerScene



Digital Topographic Support System (DTSS), Joint Mapping Tool Kit



Terrain

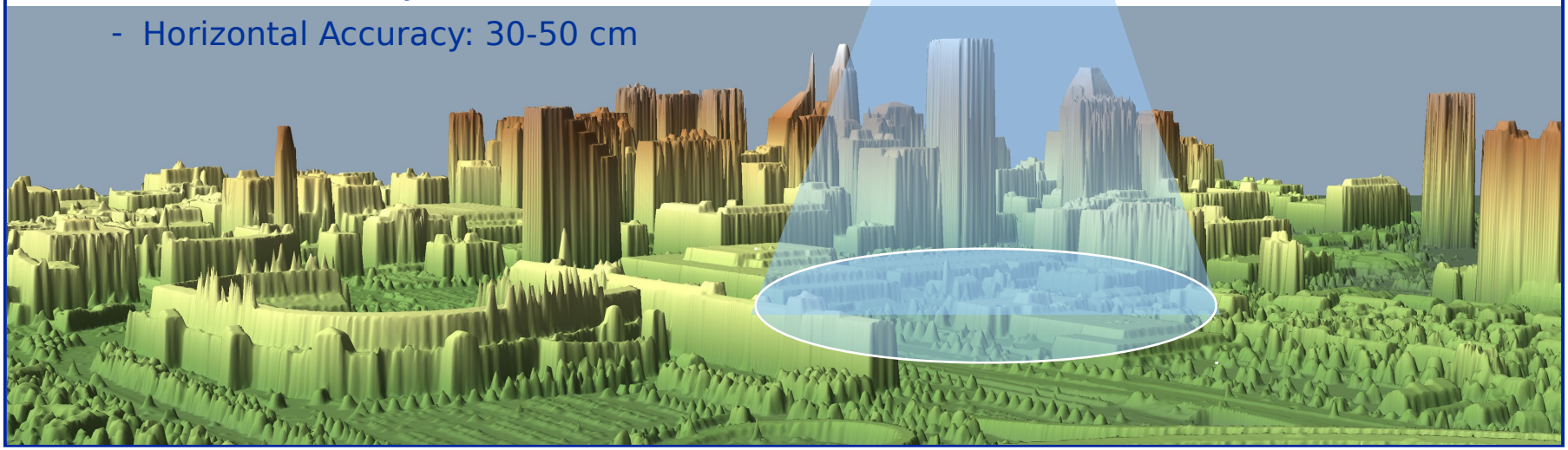
RTV Aircraft / Sensors

Laser Sensor

Light Detection and Ranging (LIDAR) Sensor

- Day or Night Collection
- Requires Line of Sight (No Clouds)
- Altitude: 6000’ – 8000’ AGL
- Swath Coverage: 500 Meters to 1500 Meters
- Resolution: 1 Meter to 1.5 Meter
- Post Mission Processing: 4-5 Hours
- Vertical Accuracy: 15-30 cm
- Horizontal Accuracy: 30-50 cm

LIDAR



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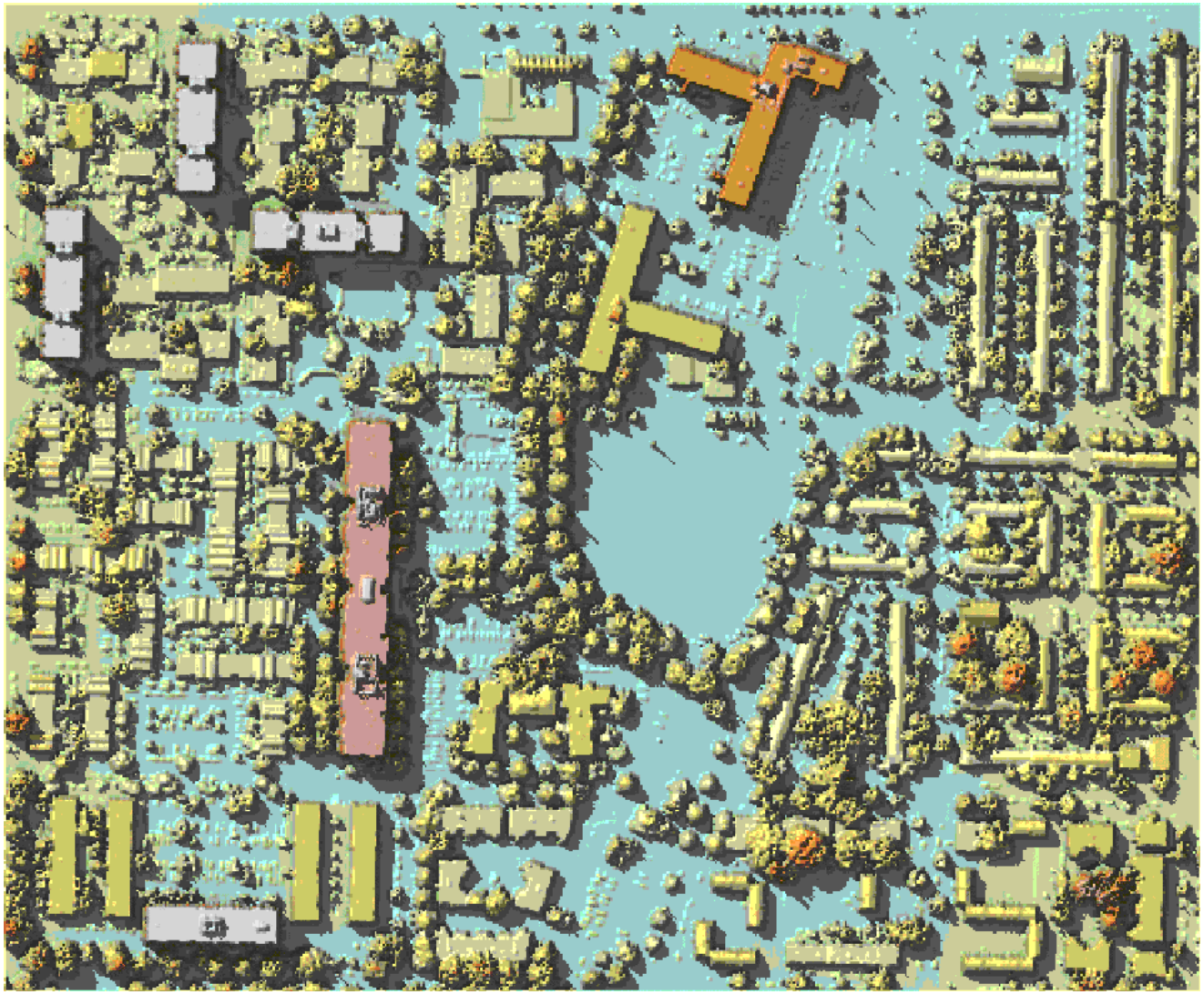
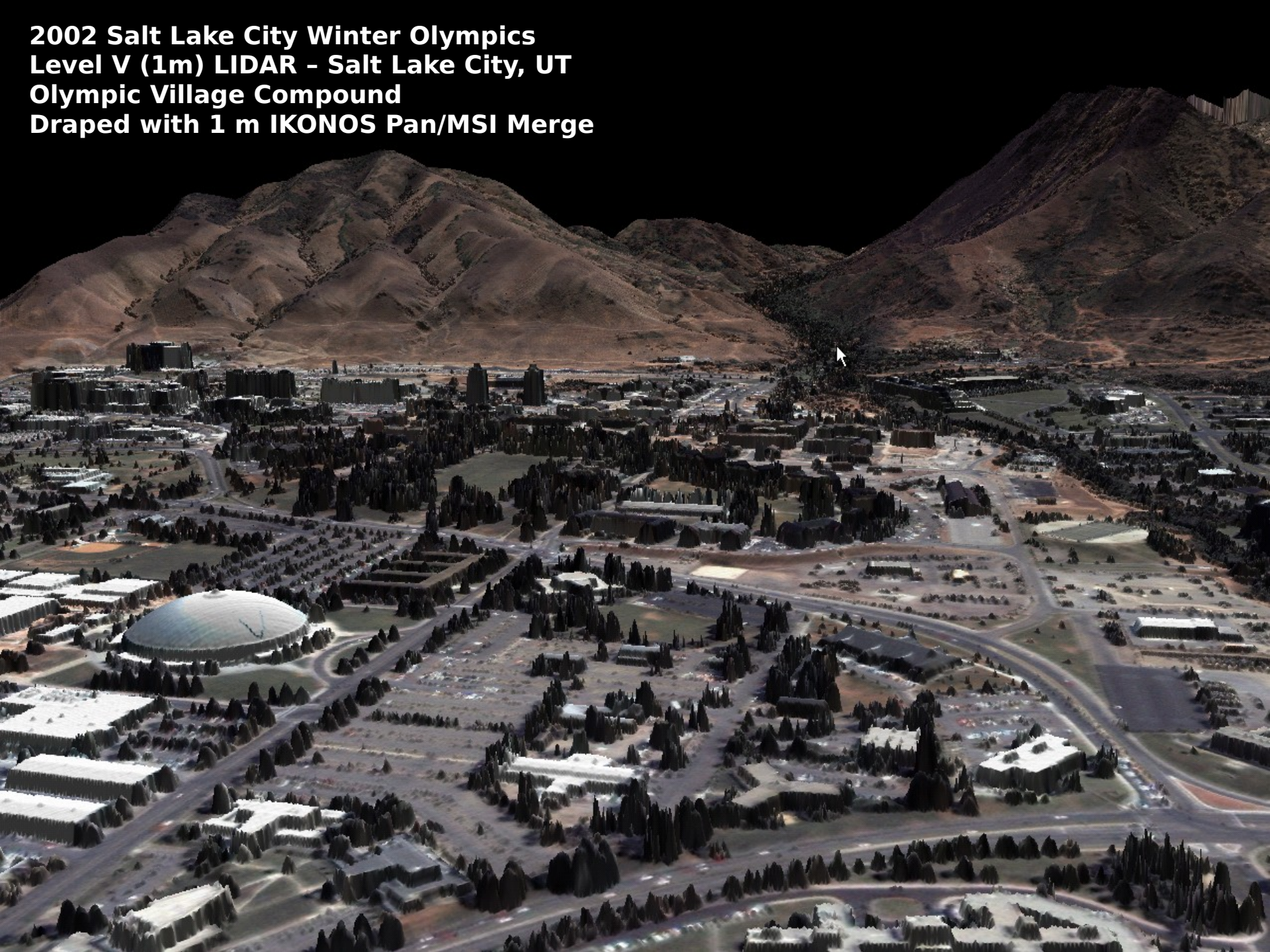
Multiple Laser Returns

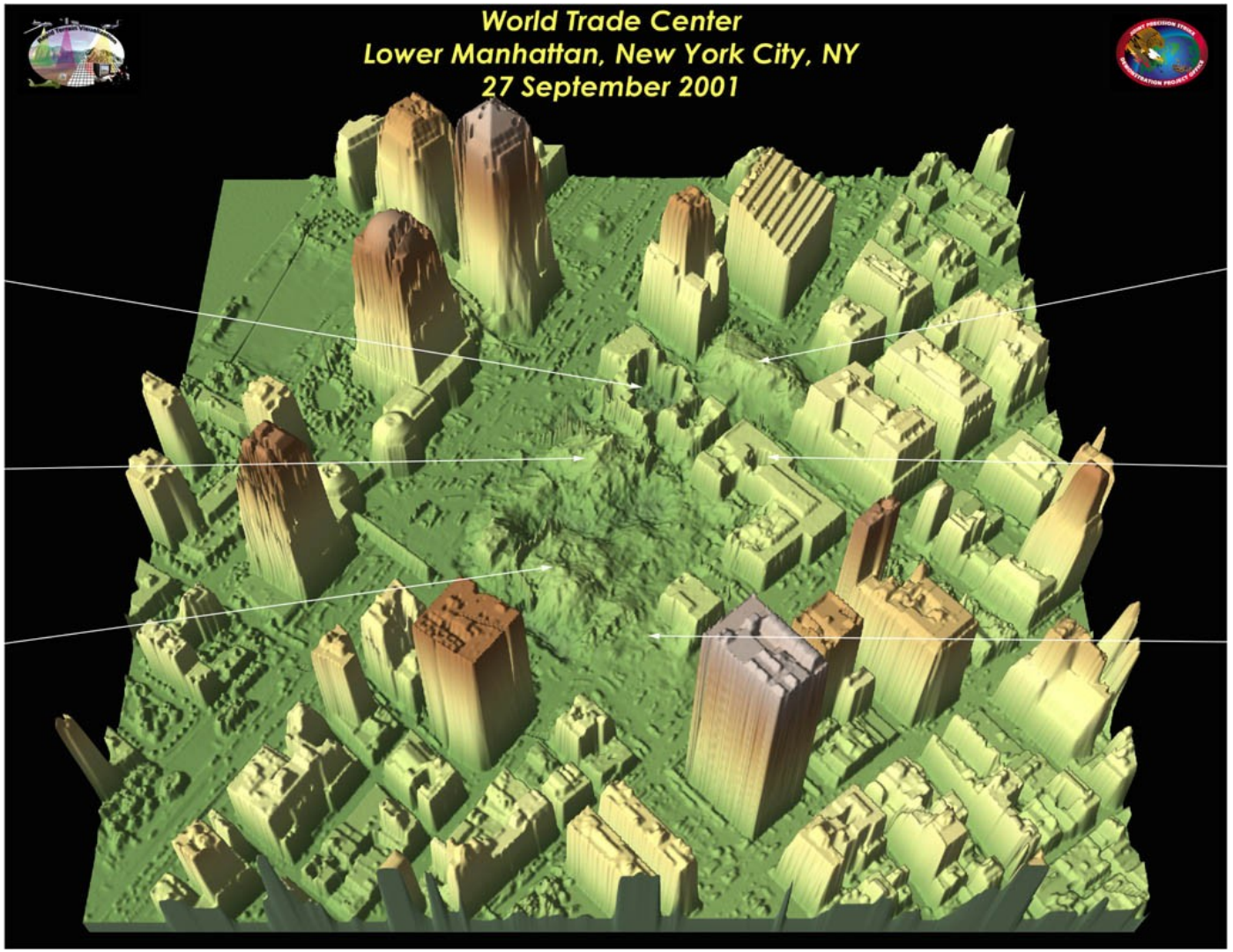
JOINT PRECISION STRIKE DEMONSTRATION PROJECT OFFICE



LIDAR Image Product
1 m resolution
Ortho-rectified to high resolution terra
Automatically Processed with LIDAR
Terrain Elevation Data


2002 Salt Lake City Winter Olympics
Level V (1m) LIDAR – Salt Lake City, UT
Olympic Village Compound
Draped with 1 m IKONOS Pan/MSI Merge

Support to World Trade Center



6 WTC (127' Tall)

Cavity Dimensions
175' x 130' Wide
154' Deep

Cavity Bottom
20' Below Sea Level

1 WTC (1,350' Tall)

Debris Dimensions
300' x 300' Wide
60' High

2 WTC (1,350' Tall)

Debris Dimensions
300' x 300' Wide
68' High

7 WTC (680' Tall)

Debris Dimensions
390' x 230' Wide
75' High

5 WTC (110')

Cavity Dimensions
55' x 42' Wide
90' Deep

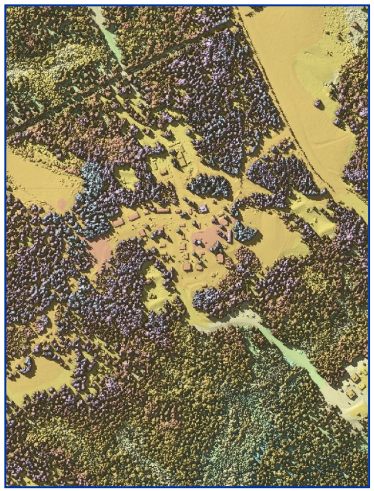
4 WTC (110')

Collapsed
230' x 165' Wide
10' High

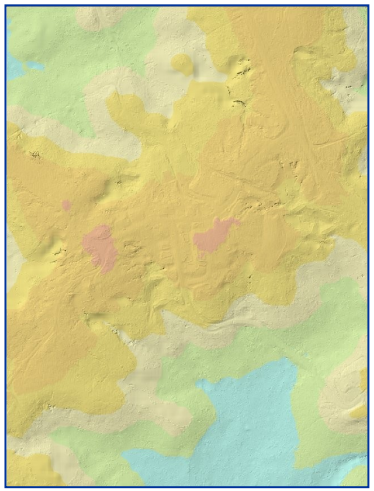
RTV LIDAR Toolkit

(Used to Generate Derivative Data Layers from Reflective Surface DEMs)

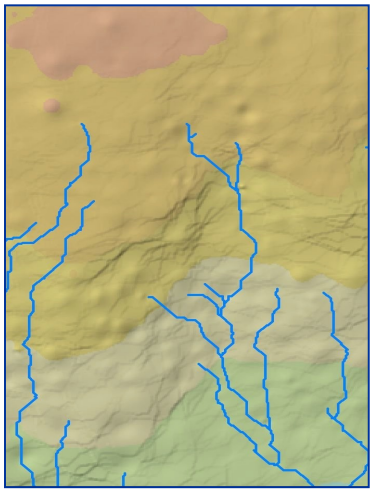
Reflective Surface DEM



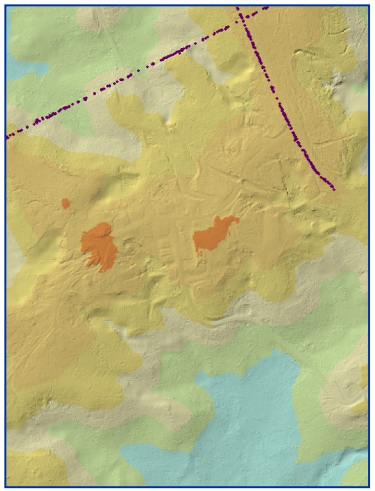
Bare Earth DEM



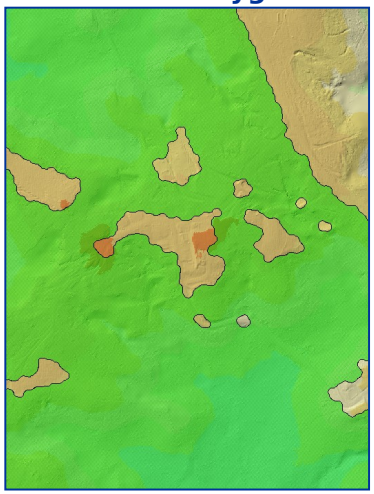
Drainage



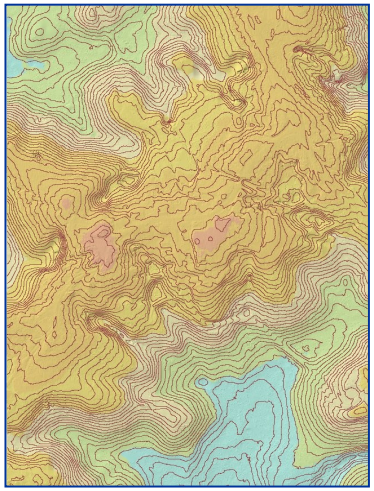
Powerlines



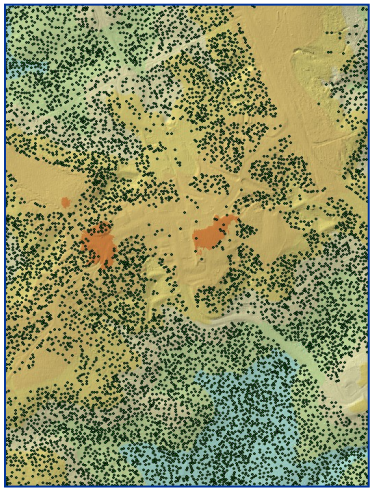
Forest Polygons



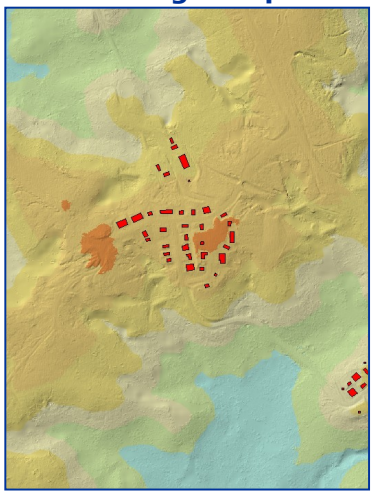
Contour Data



Individual Trees



Building Footprints



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ROK

DTED Level IV (3m Resolution)

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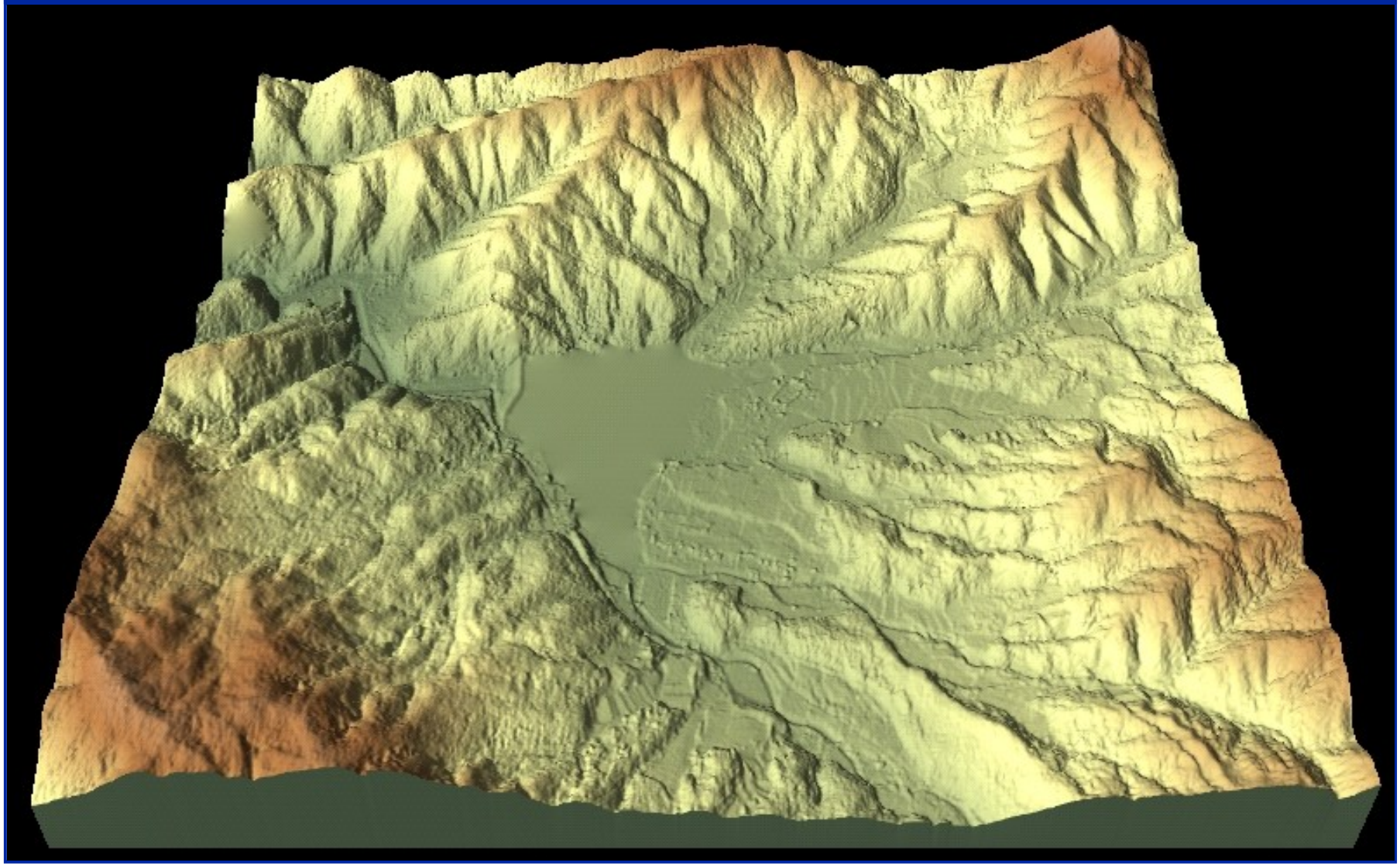
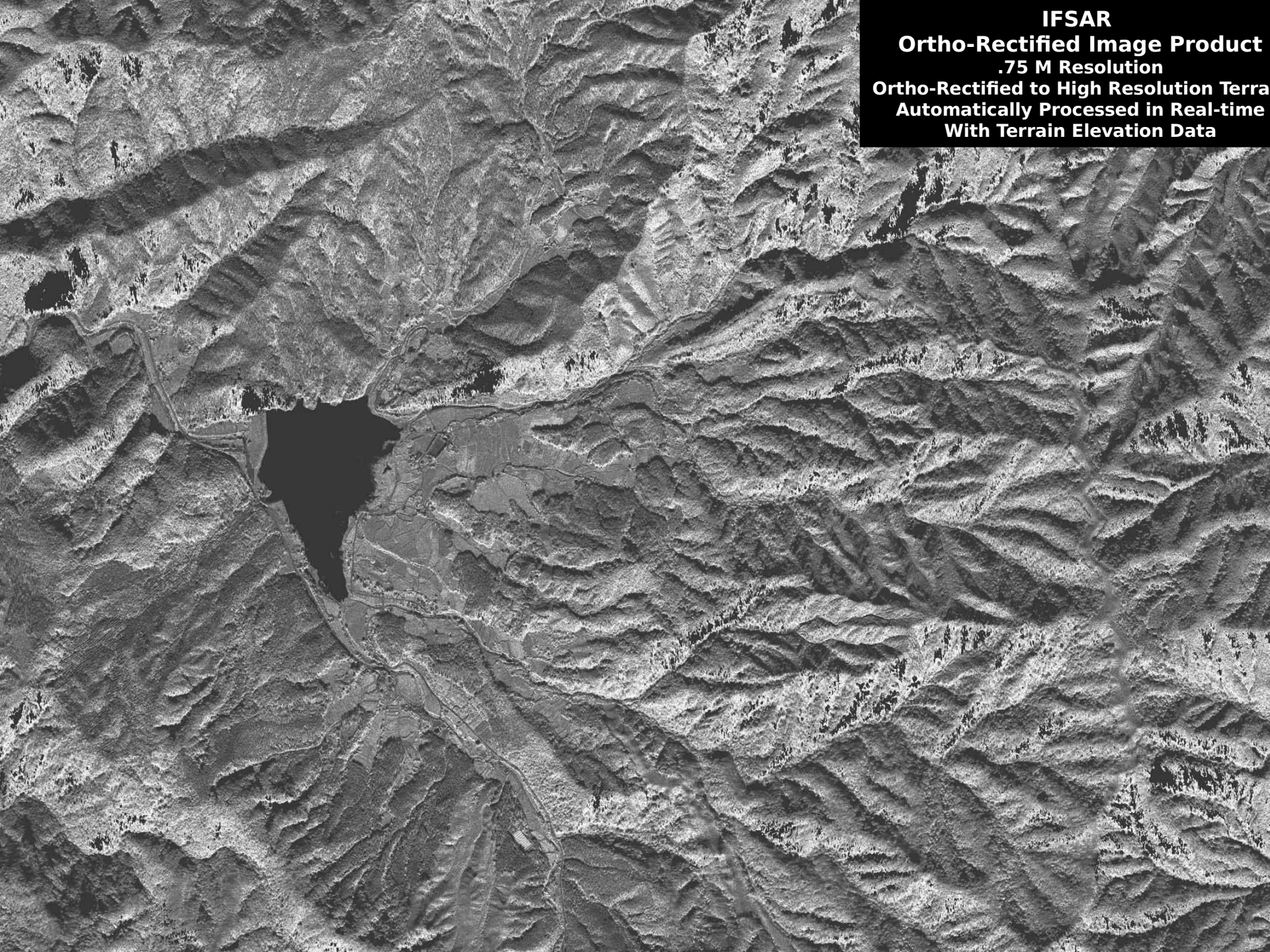
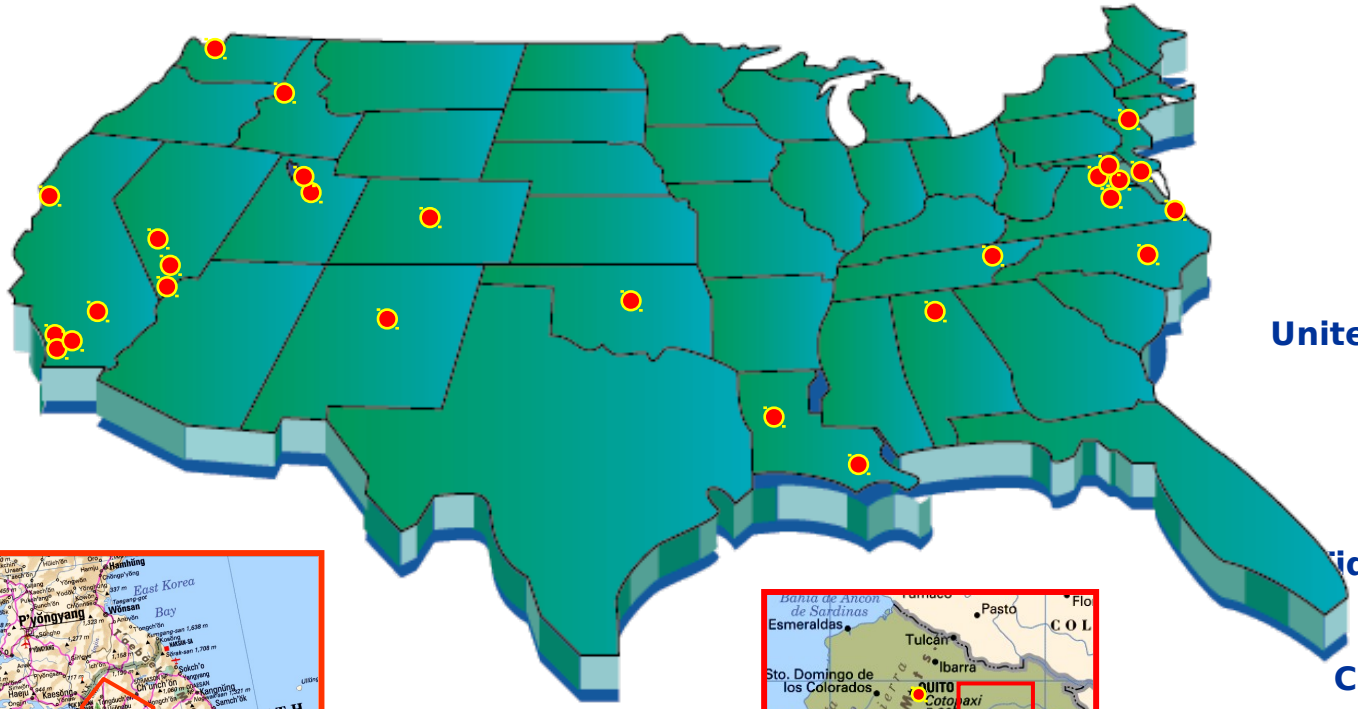



IFSAR
Ortho-Rectified Image Product
.75 M Resolution
Ortho-Rectified to High Resolution Terra
Automatically Processed in Real-time
With Terrain Elevation Data

RTV Stripmap
Slant-Plane SAR Image

Data Collections Supported



Baltimore, MD
Fort Belvoir, VA
Fort Polk, LA
Albuquerque, NM
Salt Lake City, UT
Park City, UT
Fort A.P. Hill, VA
Washington, D.C.
Fort Bragg, NC
WTC, New York
United States Pentagon
Oklahoma City, OK
Las Vegas, NV
Hoover Dam
Nellis AFB, NV
New Orleans, LA
Tidewater Region, VA
Boise, ID
Los Angeles, CA
Camp Pendleton, CA
San Diego, CA
Fort Irwin, CA
Redstone Arsenal, AL
Knoxville, TN
Fort Dix, NJ
San Francisco / Oakland, CA
Seattle / Tacoma, WA
Denver, CO

Republic of Korea

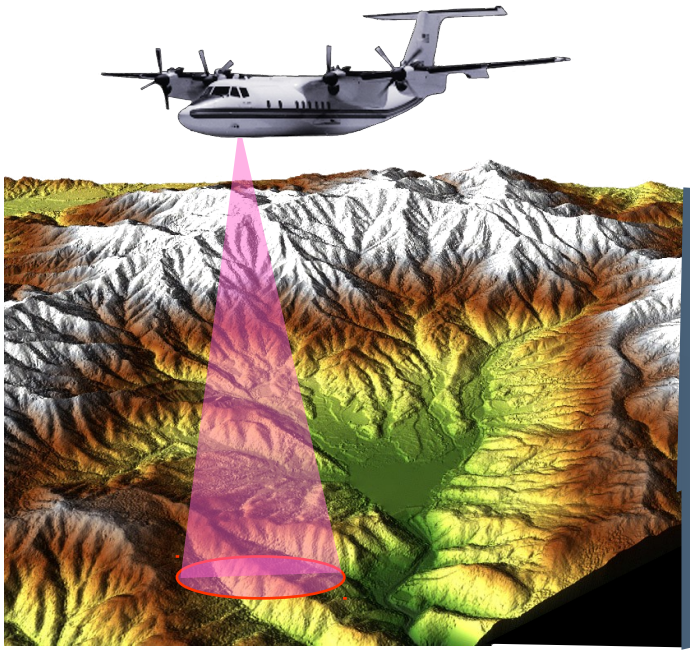
Republic of Ecuador

Data Collections Scheduled

Chicago, IL
Philadelphia, PA
Atlanta, GA
San Diego, CA
Houston, TX
Tampa/St. Petersburg, FL
Miami, FL
Minneapolis/St. Paul, MN
Dallas, TX
St. Louis, MO
Ft. Lauderdale, FL
Mobile, AL
Corpus Christi, TX
Baton Rouge, LA
Charleston, SC

Republic of Korea

Transition



Data Collection System

FY02 & +
GO/CO Operation of Aircraft & Sensors

FY03 & +
Implement Sensor Capability (LIDAR & IFSAR) on UAVs, ACS or Satellite

RTV Next Generation…

Project Objective: Rapid (≤72 hour) Collection of **High Resolution** Digital Terrain Maps Over **Hostile** Terrain From ed Aerial Vehicles

Interferometric Synthetic Aperture Radar (IFSAR)

Level IV
Swath Width
2,000 m
Level V
Spotlight
600x600 m

Predator-B

IFSAR

Hunter

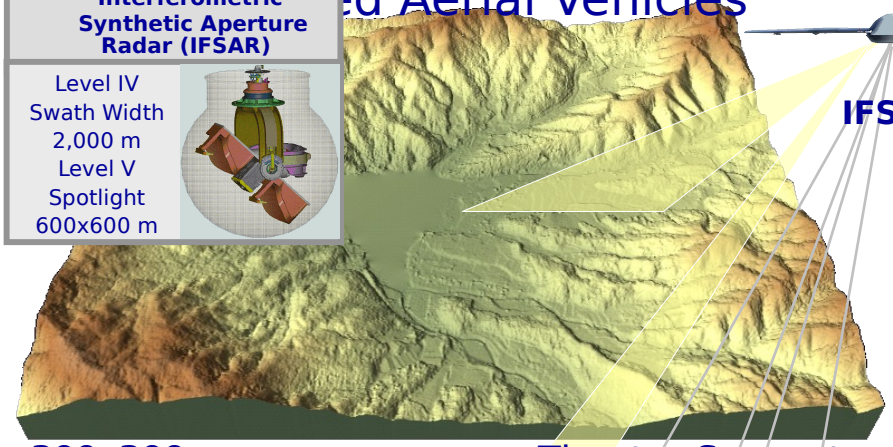
Shadow

Light Detection and Ranging (LIDAR)

Level V

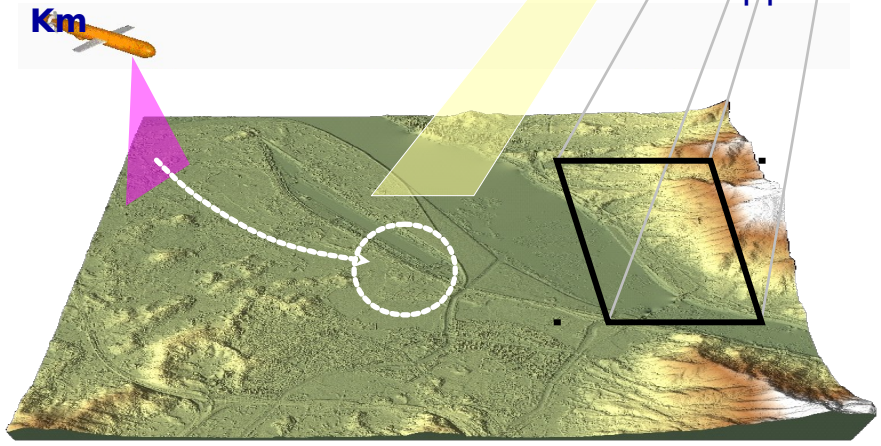
Swath Width
540m

LIDAR



300x300 Km

Theater Support



90x90 Km

Targeting

20x20 Km

Urban Warfare

High Resolution Terrain Maps are Essential to the Objective Force

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Rapid Terrain Visualization Product to the Warfighter

The Rapid Terrain Visualization Program is Providing the Army, Department of Defense, and Other Services with a Capability to Rapidly Produce the Terrain Data Required to Conduct Contingency and Crisis Operations